

CLAIMS

1. A forging method for enlarging scheduled diameter-enlarging portions located at axial end portions of a bar-shaped raw material by upsetting, the forging method, comprising the steps of:

holding an axial intermediate portion of the raw material with a holding die in a state in which the axial intermediate portion is prevented from being enlarged in diameter, disposing the axial end portions of the raw material in forming dented portions formed at axial end portions of the holding die, and disposing the scheduled diameter-enlarging portions in insertion passages formed in guides; and then

simultaneously pressing the scheduled diameter-enlarging portions with punches to fill the material of the scheduled diameter-enlarging portions in the forming dented portions while moving each guide in a direction opposite to a moving direction of each punch, thereby enlarging each scheduled diameter-enlarging portion in diameter.

2. The forging method as recited in claim 1, wherein the insertion passage of each guide is configured to hold the scheduled diameter-enlarging portion in a buckle preventing state.

3. The forging method as recited in claim 1 or 2, wherein an initial clearance having a distance less than a buckle limit length at a cross-sectional area of an exposed portion of the material is set between each guide and the holding die before initiation of movement

of each punch.

4. The forging method as recited in claim 3, wherein a time-lag is set between initiation of movement of each punch and initiation of movement of each guide.

5. The forging method as recited in any one of claims 1 to 4, wherein each guide is provided with a pressing portion to be fitted in the forming dented portion at a tip end portion of the guide.

6. The forging method as recited in any one of claims 1 to 5, wherein an insertion passage side edge portion of a tip end of each guide and/or an edge portion of a raw material fitting aperture of the holding die for fitting the axial intermediate portion of the raw material are chamfered.

7. A forged article obtained by the forging method as recited in any one of claims 1 to 6.

8. An automobile arm member obtained by the forging method as recited in any one of claims 1 to 6.

9. An automobile shaft member obtained by the forging method as recited in any one of claims 1 to 6.

10. An automobile connecting rod obtained by the forging method as recited in any one of claims 1 to 6.

11. A two-headed piston for compressors obtained by the forging method as recited in any one of claims 1 to 6.

12. A forging apparatus for enlarging scheduled diameter-enlarging portions of axial end portions of a bar-shaped raw material by upsetting, comprising:

a holding die for holding an axial intermediate portion of the raw material in a buckle preventing state;

two forming dented portions in which the scheduled diameter-enlarging portion is to be disposed, the forming dented portions being formed at axial end portions of the holding die;

two guides each having an insertion passage in which the scheduled diameter-enlarging portion is inserted; and

two punches for pressing the scheduled diameter-enlarging portions in axial direction thereof,

wherein each guide is capable of moving in a direction opposite to a moving direction of each punch.

13. The forging apparatus as recited in claim 12, further comprising two guide moving devices each for moving the guide in a direction opposite to a moving direction of the punch, each guide moving device being connected to corresponding guide.

14. The forging apparatus as recited in claim 12 or 13, wherein the insertion passage of each guide is configured to hold the scheduled diameter-enlarging portion in a buckle preventing state.

15. The forging apparatus as recited in any one of claims 12 to 14, wherein each guide is provided with a pressing portion to be fitted in a forming dented portion at a tip end portion of the guide.

16. The forging apparatus as recited in any one of claims 12 to 15, wherein an insertion passage side edge portion of a tip end of each punch and/or an edge portion of a raw material fitting aperture of the holding die for fitting the axial intermediate portion are chamfered.